



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Xi et al.

Patent No.: 7,026,238

Issued: April 11, 2006

Serial No.: 10/052,681

Filed: January 17, 2002

For: RELIABILITY BARRIER
INTEGRATION FOR CU
APPLICATION

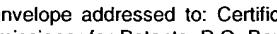
Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Group Art Unit: 2814

Examiner: Ginette Peralta

**Certificate
JUL 06 2006
of Correction**

| | |
|--|---|
| CERTIFICATE OF MAILING 37 CFR 1.8 | |
| <p>I hereby certify that this correspondence is being deposited on <u>6/26</u>, 2006 with the United States Postal Service as First Class Mail in an envelope addressed to: Certificate of Correction Branch, Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.</p> | |
| <u>6/26/06</u> |  |
| Date | Signature |

BEQUEST FOR CERTIFICATE OF CORRECTION

Attached is a Certificate of Correction for correcting several errors throughout the printed patent.

A copy of the Combined Declaration and Power of Attorney indicating the correct city of residence for inventor Paul Frederick Smith is attached. The omitted references were initialed by the Examiner in the Notice of Allowability dated December 31, 2003, signed December 10, 2003, and in the Office Action dated June 19, 2003, signed June 11, 2003. Copies of the PTO-892s and PTO-1449s showing the omitted references initialed by the Examiner are attached.

Applicants submit that at least one of the other typing errors mentioned above was made by the applicants. Therefore, please charge the fee of \$100.00 to deposit account no. 20-0782/APPM/1931.P1 (KMT).

07/03/2006 HDEMESS2 00000077 200782 7026238

01 FC:1811 100.00 DA

Respectfully submitted,

Keith M. Tackett
Registration No. 32,008

PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd. Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Agent for Applicant(s)

... my LNUO

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,026,238

Page 1 of 3

APPLICATION NO. : 10/052,681

DATED : Apr. 11, 2006

INVENTOR(S) : Ming XI, Paul Frederick SMITH, Ling CHEN, Michael X. YANG, Mei CHANG, Fusen CHEN, Cristophe MARCADAL, Jenny C. LIN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the Cover of the Patent

Item [75], Inventors: Change Paul Frederick Smith's city of residence from "San Jose, CA" to --Campbell, CA--

Item [56], References Cited, U.S. PATENT DOCUMENTS: Please add the following references:

| | | | |
|--------------|---------|-------------------------|------------|
| 6,607,977 | 8/2003 | Rozbicki et al. | 438/627 |
| 6,498,091 | 12/2002 | Chen et al. | 438/627 |
| 2003/0087520 | 5/2003 | Chen et al. | 438/643 |
| 2002/0185370 | 12/2002 | Gopalraja et al. | 204/192.17 |
| 2002/0029958 | 3/2002 | Chiang et al. | 204/192.1 |
| 6,297,114 | 10/2001 | Iwata et al. | 438/305 |
| 5,792,272 | 8/1998 | Van Os et al. | 11B/723 IR |
| 5,759,635 | 6/1998 | Logan | 427/490 |
| 5,565,074 | 10/1996 | Qian et al. | 204/298.08 |
| 5,397,962 | 3/1995 | Moslehi | 315/111.51 |
| 4,419,202 | 10/1983 | Gibson | 204/192 N |
| 6,008,117 * | 12/1999 | Hong et al. | 438/629 |
| 6,093,639 * | 07/2000 | Wu et al. | 438/629 |
| 6,156,644 * | 12/2000 | Ko et al. | 438/639 |
| 5,818,110 * | 10/1998 | Cronin | 257/775 |
| 5,407,698 * | 4/1995 | Emesh | 427/99 |
| 5,391,517 * | 2/1995 | Gelatos et al. | 438/643 |
| 6,309,801 | 10/2001 | Meijer et al. | 430/313 |
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| 6,265,757 | 7/2001 | Brady et al. | 257/623 |
| 6,229,174 | 5/2001 | Parekh | 257/306 |
| 6,221,775 | 4/2001 | Ference et al. | 438/691 |
| 6,211,071 | 4/2001 | Lukanc et al. | 438/640 |
| 6,200,433 | 3/2001 | Ding et al. | 201/192.15 |
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| 6,166,423 | 12/2000 | Gambino et al. | 257/532 |
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| 6,157,081 | 12/2000 | Nariman et al. | 257/752 |
| 6,157,061 | 12/2000 | Kawata | 257/316 |

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Keith M. Tackett
 PATTERSON & SHERIDAN, L.L.P.
 3040 Post Oak Blvd., Suite 1500
 Houston, TX 77056-6582

JES J. L. 10/10/06

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,026,238

Page 2 of 3

APPLICATION NO. : 10/052,681

DATED : Apr. 11, 2006

INVENTOR(S) : Ming XI, Paul Frederick SMITH, Ling CHEN, Michael X. YANG, Mei CHANG, Fusen CHEN, Cristophe MARCADAL, Jenny C. LIN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

| | | | |
|-----------|---------|----------------------|------------|
| 6,143,646 | 11/1000 | Wetzel | 438/637 |
| 6,023,102 | 2/2000 | Nguyen et al. | 257/774 |
| 6,017,817 | 1/2000 | Chung et al. | 438/637 |
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| 5,674,787 | 10/1997 | Zhao et al. | 437/230 |
| 5,654,232 | 8/1997 | Gardner | 438/661 |
| 5,613,296 | 3/1997 | Kurino et al. | 29/852 |
| 5,565,029 | 10/1996 | Takasu | 117/1 |
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| 4,962,060 | 10/1990 | Sliwa et al. | 437/192 |
| 4,951,601 | 8/1990 | Maydan et al. | 118/719 |

Item [56], References Cited, FOREIGN PATENT DOCUMENTS: Please add the following references:

JP 08-213,119 7/1996

Item [56], References Cited, OTHER PUBLICATIONS: Please add the following references:

Ghandi, Sorab K., "VLSI Fabrication Principles, Silicon and Gallium Arsenide" Second Edition, Wiley-Interscience Publication (1994), Pages 617-620 and Page 652.

R. F. Bunshah, "Handbook of Deposition Technologies for Films and Coatings", 2nd edition, Noyas Publications, NJ, USA, 1994, 261, 321-325.

Gardner et al., "Encapsulated Copper Interconnection Device using Sidewall Barriers", Thin Solid Films 262 (1995) 104-119.

Jang et al., "Tantalum and Niobium as a Diffusion Barrier between Copper and Silicon", J. Materials Science: Materials in Electronics 7 (1996) 271-278.

Tadashi Iijima, Yoshiakai Shimooka, and Kyoichi Suguro, "An Amorphous Ti-Si-N Diffusion Barrier Layer for Cu Interconnections," Vol. 78, No. 12, 1995, pages 67-74.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Keith M. Tackett
 PATTERSON & SHERIDAN, L.L.P.
 3040 Post Oak Blvd., Suite 1500
 Houston, TX 77056-6582

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Page 3 of 3

APPLICATION NO. : 10/052,681

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INVENTOR(S) : Ming XI, Paul Frederick SMITH, Ling CHEN, Michael X. YANG, Mei CHANG, Fusen CHEN, Cristophe MARCADAL, Jenny C. LIN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Mikagi H. Ishikawa, T. Usami, M. Suzuki, K. Inoue, N. Oda, S. Chikaki, I. Sakai and T. Kikkawa. "Barrier Metal Free Copper Damascene Interconnection Technology Using Atmospheric Copper Reflow and Nitrogen Doping in SiOF Film." 1996 IEEE. Pp. 365-368.

Y. Shacham-Diamond, V. Dubin, and M. Angyal "Electroless Copper Deposition for ULSI" 1995 Elsevier Science S.A., pp. 93-103.

Electromigration and Diffusion in Pure Cu and Cu(Sn) Alloys. C. K. Hu, K. L. Lee, D. Gupta, and P. Blauner, Mat. Res. Soc. Symp. Vol 427 (96-105).

Electromigration Failure Distributions for Multi-Large Interconnects as a Function of Line Width Experiments and Simulation, D.D. Brown, J.E. Sanchez, Jr., V. Pham, P.R. Besser, M.A. Korhonen, and C.Y. Li, Mat. Res. Soc. Symp. Vol 427.

USSN Serial No.: 09/635,738, Chen, et al., "Barrier Layer Structure for Copper Metallization and Method of Forming the Structure," Filed: August 09, 2000.

In the Specification

Column 5, Lines 34 and 35: Change each instance of "MHZ" to --MHz--

Column 5, Line 35: Add a period after "MHz"

Column 7, Line 47: Change "dc" to --DC--

Column 8, Line 12: After "fill", insert --of--

Column 8, Line 33: Change "Ta/aN" to --Ta/TaN--

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Keith M. Tackett
 PATTERSON & SHERIDAN, L.L.P.
 3040 Post Oak Blvd., Suite 1500
 Houston, TX 77056-6582

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



JUN 30 2006

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> R31

NOTICE OF ALLOWANCE AND FEE(S) DUE

COPY

32588 7590 12/31/2003

JAN 5 2004

EXAMINER

PERALTA, GINETTE

APPLIED MATERIALS, INC.
 2881 SCOTT BLVD. M/S 2061
 SANTA CLARA, CA 95050

RECD JAN 5 2004

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 12/31/2003

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------------|------------------|
| 10/052,681 | 01/17/2002 | Ming XG | AMAT/1931.P1.CPI/ALUMINUM | 4083 |

TITLE OF INVENTION: RELIABILITY BARRIER INTEGRATION FOR CU APPLICATION

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE | PUBLICATION FEE | TOTAL FEE(S) DUE | DATE DUE |
|----------------|--------------|-----------|-----------------|------------------|------------|
| nonprovisional | NO | \$1330 | \$300 | \$1630 | 03/31/2004 |

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

Applicant claims SMALL ENTITY status.
 See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

2006

Notice of Allowability

| | Application No. | Applicant(s) |
|-----------------|-----------------|--------------|
| | 10/052,681 | XI ET AL |
| Examiner | | Art Unit |
| Ginette Peralta | 2814 | MW |

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address. If all claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

This communication is responsive to Amendment filed on 9/22/03.

The allowed claim(s) is/are 1-38.

The drawings filed on 17 January 2002 are accepted by the Examiner.

Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some* c) None of the:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

i. Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

(a) The translation of the foreign language provisional application has been received.

j. Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

7. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

8. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1) hereto or 2) to Paper No. _____.

(b) including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.

(c) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1 Notice of References Cited (PTO-892)

2 Notice of Draftsperson's Patent Drawing Review (PTO-948)

3 Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No. 9/03,11/03

4 Examiner's Comment Regarding Requirement for Deposit
of Biological Material

5 Notice of Informal Patent Application (PTO-152)

6 Interview Summary (PTO-413), Paper No. _____

7 Examiner's Amendment/Comment

8 Examiner's Statement of Reasons for Allowance

9 Other

SU:

JAN 2006

Sheet 1 of 1 sheets

| | | | |
|--|-----------------------------|---|--------------------------|
| U.S. Department of Commerce, Patent and Trademark Office (PTO Form 1449 modified) | | Docket No. AMAT/1931.P1/CPI/ COPPER/PJS | Serial No. 10/052,681 |
| SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT | | Applicant Xi, et al. | Confirmation No. 4083 |
| (Use several sheets if necessary) | | Filing Date January 17, 2002 | Group 2814 |
| | Examiner Ginette Peralta | | |

U.S. Patent Documents

| *Examiner Initial | | Document Number | Issue Date | Applicant(s) Name | Class | Subclass | Filing Date If Appropriate |
|-------------------|-----|-----------------|------------|-------------------|-------|----------|----------------------------|
| GP | A1 | 6,607,977 | 08/19/2003 | Rozbicki, et al. | 438 | 627 | 09/26/2001 |
| GP | A2 | 6,498,091 | 12/24/2002 | Chen, et al. | 438 | 627 | 11/01/2000 |
| GP | A3 | 2003/0087520 | 05/08/2003 | Chen, et al. | 438 | 643 | 11/07/2002 |
| GP | A4 | 2002/0185370 | 12/12/2002 | Gopalraja, et al. | 204 | 192.17 | 07/16/2002 |
| GP | A5 | 2002/0029958 | 03/14/2002 | Chiang, et al. | 204 | 192.1 | 06/20/2001 |
| | A6 | | | | | | |
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Foreign Patent Documents

| *Examiner Initial | | Document Number | Date | Country | Class | Subclass | Translation | |
|-------------------|----|-----------------|------|---------|-------|----------|--------------------------|--------------------------|
| | | | | | | | YES | NO |
| | B1 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B2 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
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| | B4 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B5 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |

OTHER ART

| | | |
|-------------------|----|--|
| *Examiner Initial | | Including Author, Title, Date, Pertinent Pages, Etc. |
| | C1 | |
| | C2 | |

Examiner Ginette PeraltaDate Considered 12/10/03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.

JULY 17 2003

Sheet 1 of 1 sheets

| | | | |
|---|-----------------------------|---|--------------------------|
| U.S. Department of Commerce Patent and Trademark Office (PTO Form 1449 modified) | | Docket No. AMAT/1931.P1/CPI/COPPER/PJS | Serial No. 10/052,681 |
| SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT | | Applicant Xi, et al. | Confirmation No. 4083 |
| (Use several sheets if necessary) | | Filing Date January 17, 2002 | Group 2814 |
| | Examiner Ginette Peralta | | |

U.S. Patent Documents

| *Examiner Initial | | Document Number | Issue Date | Applicant(s) Name | Class | Subclass | Filing Date If Appropriate |
|-------------------|-----|-----------------|------------|-------------------|-------|----------|----------------------------|
| GP | A1 | 6,297,114 | 10/02/2001 | Iwata, et al. | 438 | 305 | 12/04/1998 |
| GP | A2 | 5,792,272 | 08/11/1998 | Van Os, et al. | 118 | 723 IR | 08/12/1997 |
| GP | A3 | 5,759,635 | 06/02/1998 | Logan | 427 | 490 | 07/03/1996 |
| GP | A4 | 5,565,074 | 10/15/1996 | Qian, et al. | 204 | 298.08 | 07/27/1995 |
| GP | A5 | 5,397,962 | 03/14/1995 | Moslehi | 315 | 111.51 | 06/29/1992 |
| GP | A6 | 4,419,202 | 12/06/1983 | Gibson | 204 | 192 N | 12/17/1981 |
| | A7 | | | | | | |
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| | A11 | | | | | | |
| | A12 | | | | | | |
| | A13 | | | | | | |

Foreign Patent Documents

| *Examiner Initial | | Document Number | Date | Country | Class | Subclass | Translation | |
|-------------------|----|-----------------|------|---------|-------|----------|--------------------------|--------------------------|
| | | | | | | | YES | NO |
| | B1 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B2 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B3 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B4 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |
| | B5 | | | | | | <input type="checkbox"/> | <input type="checkbox"/> |

OTHER ART

| | | |
|-------------------|--|---|
| *Examiner Initial | Including Author, Title, Date, Pertinent Pages, Etc. | |
| GP | C1 | Ghandhi, Sorab K., "VLSI Fabrication Principles, Silicon and Gallium Arsenide" Second Edition, Wiley-Interscience Publication (1994), Pages 617-620 and Page 652. |
| | C2 | |

Examiner Ginette Peralta Date Considered 12/10/03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.

M

Notice of References Cited

| | | |
|-------------------------|------------|---|
| Application/Control No. | 10/052,681 | Applicant(s)/Patent Under Rexamination XI ET AL |
|-------------------------|------------|---|

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|-----------------------------|------------------|-------------|
| Examiner Ginette Peralta | Art Unit 2814 | Page 1 of 1 |
|-----------------------------|------------------|-------------|

U.S. PATENT DOCUMENTS

| * | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|--|-----------------|-------------|----------------|
| A | US-6,008,117 | 12-1999 | Hong et al. | 438/629 |
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| D | US- | | | |
| E | US- | | | |
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| L | US- | | | |
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FOREIGN PATENT DOCUMENTS

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Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)

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A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(g).)
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------------|------------------|
| 10/052,681 | 01/17/2002 | Ming Xi | AMAT/1931.P1.CPI/ALUMINUM | 4083 |

32588 7590 06/19/2003

APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

PERALTA, GINETTE

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2814 | |

DATE MAILED: 06/19/2003

OFC 9.19
Dead 12.19

Please find below and/or attached an Office communication concerning this application or proceeding.

JUN 26 2003

COPY

| Office Action Summary | Application No. | Applicant(s) | |
|------------------------------|------------------------------------|-------------------------|--|
| | 10/052,681 | XI ET AL. | |
| | Examiner Ginette Peralta | Art Unit 2814 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 31 March 2003 .

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-38 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-38 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

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Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .

4) Interview Summary (PTO-413) Paper No(s). _____
5) Notice of Informal Patent Application (PTO-152)
6) Other: _____

Notice of References Cited

Application/Control No.
10/052,681

Applicant(s)/Patent Under
Reexamination
XI ET AL.

Examiner
Ginette Peralta

Art Unit
2814

Page 1 of 1

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| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
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| | B | US-5,407,698 | 04-1995 | Emesh, Ismail T. | 427/99 |
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| | D | US- | | | |
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| | K | US- | | | |
| | L | US- | | | |
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NON-PATENT DOCUMENTS

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

07 2000

| U.S. Department of Commerce, Patent and Trademark Office (PTO Form 1449 modified) | | | | | Locket No. AM.../1931.P1 | | Serial No. 10/052,681 | |
|---|-------------|---|-------------------------|-------------------|------------------------------|----------|----------------------------|----|
| LISTS OF PATENTS AND PUBLICATIONS CITED BY APPLICANT | | | | | Applicant Xi, et al. | | Confirmation No.: 4083 | |
| (Use several sheets if necessary) | | | | | Filing Date January 17, 2002 | | Group 2814 | |
| U.S. Patent Documents | | | | | | | | |
| Examiner Initial | | Document Number | Issue Date | Applicant(s) Name | Class | Subclass | Filing Date If Appropriate | |
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| | | | | | | | YES | NO |
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| Examiner | Q.P. Reatta | | Date Considered 6/11/03 | | | | | |
| *EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. | | | | | | | | |

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| U.S. Department of Commerce, Patent and Trademark Office (PTO Form 1449 modified) | | LUcket No. AM 1931.P1 | Serial No. 10/052,681 |
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| (Use several sheets if necessary) | | Filing Date January 17, 2002 | Group 2814 |
| | Examiner Unknown | | |

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|------------------|----|-----------------|------|---------|-------|----------|-------------|----|
| | | | | | | | YES | NO |
| | B4 | | | | | | | |
| | B5 | | | | | | | |
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| | Examiner Unknown | | | | January 17, 2002 | Unknown | | |
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| Examiner Initial | | Document Number | Date | Country | Class | Subclass | Translation | |
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| | B08 | | | | | | | |
| | B09 | | | | | | | |
| OTHER ART | | | | | | | | |
| Examiner Initial | | Including Author, Title, Date, Pertinent Pages, Etc. | | | | | | |
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| Examiner | <i>Guadalupe Peralta</i> | | | Date Considered <i>6/11/03</i> | | | | |
| *EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. | | | | | | | | |



Atty. Dkt. No. AMAT/1931.P1/CPI/ALUMINUM/PJS

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

This declaration is of the following type:

- original
- divisional
- continuation
- continuation-in-part

COPY

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

RELIABILITY BARRIER INTEGRATION FOR CU APPLICATION

SPECIFICATION IDENTIFICATION

The specification of which:

- is attached hereto
- was filed on _____, under Serial No. _____, executed on even date herewith; or
- Express Mail No. (as Serial No. not yet known)
and was amended on _____ (if applicable)
- was described and claimed in PCT International Application No. _____
filed on _____ and as amended under PCT Article 19 on _____.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, 1.56, and which is material to the examination of this application; namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and

- In compliance with this duty there is attached an Information Disclosure Statement in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. 119)

I hereby claim foreign priority benefits under Title 35, United States Code, 119, of any provisional or foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below, and have also identified below any provisional or foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

No such applications have been filed.

Such applications have been filed as follows:

A. Prior foreign/PCT application(s) filed within 12 mos. (6 mos. for design) prior to this application, and any priority claims under 35 U.S.C. 119

| <u>Country/PCT</u> | <u>Application No</u> | <u>Date Filed</u> | <u>Priority Claimed</u> |
|--------------------|-----------------------|-------------------|--|
| | | | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | | | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | | | <input type="checkbox"/> Yes <input type="checkbox"/> No |

B. All foreign application(s), if any, filed more than 12 mos. (6 mos for design) prior to this U.S. application

Country:

Application No:

Filing date:

C. U.S. Provisional Application filed within 12 months prior to this application

| <u>Serial No.</u> | <u>Filing Date</u> |
|-------------------|--------------------|
|-------------------|--------------------|

PRIORITY CLAIM (35 U.S.C. 120)

I hereby claim the benefit under Title 35, United States Code, 120, of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose information that is material to the examination of this application (namely, information where there is substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

No such applications have been filed

Such applications have been filed, as follows:

| <u>Serial No.</u> | <u>Filing Date</u> | <u>Patented</u> | <u>Pending</u> | <u>Status</u> |
|-------------------|--------------------|-----------------|----------------|------------------|
| 08/856,116 | May 14, 1997 | | Pending | <u>Abandoned</u> |

POWER OF ATTORNEY

I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

| | |
|-----------------------|-------------------------|
| Donald Verplancken | Registration No. 33,217 |
| Michael B. Einschlag | Registration No. 29,301 |
| Peter J. Sgarbossa | Registration No. 25,610 |
| Lawrence Edelman | Registration No. 25,226 |
| Michael L. Sherrard | Registration No. 28,041 |
| Raymond Kam-On Kwong | Registration No. 37,165 |
| James C. Wilson | Registration No. 35,412 |
| Robert W. Mulcahy | Registration No. 25,436 |
| Walter Benjamin Glenn | Registration No. 44,713 |
| B. Todd Patterson | Registration No. 37,906 |
| Raymond R. Moser, Jr. | Registration No. 34,682 |
| Keith M. Tackett | Registration No. 32,008 |
| Douglas H. Elliott | Registration No. 32,982 |
| William B. Patterson | Registration No. 34,102 |

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Send correspondence to: **Direct telephone calls to:**

| | |
|--|--|
| Patent Counsel Applied Materials, Inc. P.O. Box 450-A Santa Clara, CA 95052 | B. Todd Patterson MOSER, PATTERSON & SHERIDAN, L.L.P. 713-623-4844 |
|--|--|

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Sec. 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full name of first inventor: MING XI

Inventor's signature: _____ Date: _____

Residence: 138 Beaumere Way
Milpitas, CA 95035

Post Office Address: SAME AS ABOVE
U.S.A.

Country of Citizenship: P.R. CHINA

Full name of second inventor: PAUL FREDERICK SMITH

Inventor's signature: *Paul Frederick Smith* Date: 01/10/02

Residence: 225 E. Taylor Street #4
San Jose, CA 95112

Post Office Address: SAME AS ABOVE
U.S.A. *(B)*

Country of Citizenship: USA

*955 Stonehurst Way
Campbell, CA 95008*